

In the Claims:

1. (Currently Amended) A well pumping system, comprising:

a downhole rotary pump having a well fluid intake and a discharge;

a downhole reciprocating pump operatively coupled to the discharge of the rotary pump and mounted to an upper end of the rotary pump for receiving well fluid from the discharge of the rotary pump to cause the reciprocating pump to stroke, the reciprocating pump having a well fluid intake and a discharge for pumping well fluid to the surface of the well; and

a conduit leading from the intake of the reciprocating pump alongside the rotary pump to below the well fluid intake of the rotary pump, for drawing well fluid into the reciprocating pump from a point below the well fluid intake of the rotary pump.

2. (Currently Amended) The system according to claim 1, wherein the motor is located below the well fluid intake of the rotary pump and immersed in well fluid so that well fluid flowing to the well fluid intake of the rotary pump flows past the motor for cooling the motor.

3. (Original) The system according to claim 1, wherein the rotary pump is electrically driven.

4. (Original) The system according to claim 1, wherein the rotary pump is a centrifugal pump coupled to a downhole electrical motor.

5. (Currently Amended) A well pumping system, comprising:

a downhole rotary pump having a well fluid intake and a discharge;

a downhole reciprocating pump having a well fluid intake and a discharge for pumping well fluid to the surface of the well;

a drive piston operatively coupled to the reciprocating pump for stroking the reciprocating pump;

a sequencing valve operatively connected between the drive piston and the discharge of the rotary pump for alternately supplying well fluid discharged by the rotary pump to opposite sides of the drive piston, the sequencing valve comprising:

a shuttle valve housing having an inlet port connected to the discharge of the rotary pump, an upstroke outlet port in communication with an upstroke side of the drive piston, a downstroke outlet port in communication with a downstroke side of the drive piston; and

a spool reciprocally carried in the shuttle valve housing, the spool having an upstroke passage that communicates the inlet port with the upstroke outlet port while the spool is in an upstroke position, the spool having a downstroke passage that communicates the inlet port with the downstroke outlet port while the spool is in a downstroke position.

6. (Previously Presented) The system according to claim 1, further comprising:

a drive piston for reciprocation by well fluid supplied by the discharge of the rotary pump, the drive piston being operatively connected with the reciprocating pump for stroking the reciprocating pump; and

wherein an exhaust of the drive piston is in communication with the conduit for exhausting well fluid to a point below the motor for cooling the motor.

7. (Previously Presented) The system according to claim 5, wherein the sequencing valve comprises:

a first piston end on the spool in fluid communication with a portion of the discharge of the rotary pump while the spool is in the upstroke position; and

a second piston end in fluid communication with a portion of the discharge of the rotary pump while the spool is in the downstroke position.

8. (Currently Amended) A well pumping system, comprising:

a downhole rotary pump having a well fluid intake and a discharge;

a downhole reciprocating pump having a well fluid intake and a discharge for pumping well fluid to the surface of the well;

a drive piston operatively connected to the discharge of the rotary pump for stroking the reciprocating pump in response to well fluid being discharged by the rotary pump; and

wherein the reciprocating pump is coupled to the drive piston by a shaft, the shaft having a passage therethrough that leads from the intake of the reciprocating pump to the discharge of the reciprocating pump.

9. (Original) A well pumping system, comprising:

a downhole rotary pump having an intake for receiving well fluid and a discharge;

a downhole electrical motor connected to the rotary pump for driving the rotary pump;

a downhole reciprocating pump, having a primary piston that strokes within a primary cylinder, and a secondary piston of lesser diameter than the primary piston, the secondary piston being carried within a secondary cylinder and movable in unison with the primary piston, the secondary cylinder being in communication with well fluid for pumping the well fluid to the surface of the well; and

a sequencing valve connected between the discharge of the rotary pump and the primary cylinder for alternately supplying at least a portion of the well fluid discharged by the rotary pump to opposite sides of the primary piston for stroking the primary and secondary pistons.

10. (Original) The system according to claim 9, wherein the secondary cylinder is in communication with a portion of the well fluid discharged by the rotary pump.

11. (Original) The system according to claim 9, further comprising:

an exhaust conduit operatively connected to the sequencing valve for exhausting the well fluid from the primary cylinder as the primary piston strokes, the exhaust conduit leading downward to a point below the motor.

12. (Previously Presented) The system according to claim 9, further comprising:

an intake chamber coaxially aligned with the secondary cylinder;

a plunger joining the primary piston on a side opposite the secondary piston and extending into the intake chamber;

a standing valve that admits well fluid into the intake chamber during an upward stroke of the plunger and blocks flow into the intake chamber during a downward stroke of the plunger;

a passage extending through the plunger, the primary piston, and the secondary piston for delivering well fluid from the intake chamber to the secondary cylinder; and

a traveling valve in the passage for blocking the passage while the plunger moves upward and opening the passage while the plunger moves downward.

13. (Currently Amended) A well pumping system, comprising:

a string of tubing for extending into a well;

a centrifugal pump carried by the tubing and having an intake for receiving well fluid;

an electrical motor submersed in well fluid and operatively connected to the centrifugal pump for driving the centrifugal pump;

a primary piston carried within a primary cylinder;

a secondary piston of lesser diameter than the primary piston, the secondary piston being carried within a secondary cylinder and movable in unison with the primary piston, the secondary piston being in fluid communication with well fluid ;

a shuttle valve that shifts between power and exhaust positions, the shuttle valve being connected to the discharge of the rotary pump and to the primary cylinder for alternately supplying at least a portion of the well fluid discharged by the centrifugal pump to opposite sides of the primary piston for stroking the primary and secondary pistons; and

an intake and discharge valve mechanism that admits well fluid to the secondary cylinder while the secondary piston is moving in a downward direction and allows the well fluid to be pumped from the secondary cylinder while the secondary piston is moving upward.

14. (Original) The system according to claim 13, further comprising:

an exhaust conduit operatively connected to the sequencing valve for exhausting the well fluid from the primary cylinder on an exhaust side of the primary piston, the exhaust conduit leading downward to a point below the motor.

15. (Previously Presented) The system according to claim 13, wherein the intake and discharge valve mechanism comprises:

an intake chamber coaxially aligned with the secondary cylinder;

a plunger joining the primary piston on a side opposite the secondary piston and extending sealingly into the intake chamber;

a standing valve that admits well fluid into the intake chamber during an upward stroke of the plunger and blocks flow into the intake chamber during a downward stroke of the plunger;

a passage extending through the plunger, the primary piston, and the secondary piston for delivering well fluid from the intake chamber to the secondary cylinder; and

a traveling valve in the passage for blocking the passage while the plunger moves upward and opening the passage while the plunger moves downward.

16. (Previously Presented) A method for pumping a well, comprising:

(a) installing a rotary pump and motor assembly and a reciprocating pump within a well such that each of the pumps has an intake in fluid communication with well fluid in the well;

(b) rotating the rotary pump to pump well fluid; and

(c) supplying at least a portion of well fluid pumped by the rotary pump to the reciprocating pump, driving the reciprocating pump in response to well fluid being supplied from the rotary pump, and pumping well fluid to the surface of the well with the reciprocating pump; and

(d) simultaneously while driving the reciprocating pump, flowing well fluid past the motor for cooling the motor.

17. (Previously Presented) The method according to claim 16, wherein step (d) comprises mounting the motor below the rotary pump and immersing the motor in well fluid .

18.(Previously Presented) The method according to claim 16, wherein:

step (a) comprises coupling an electrical motor to the rotary pump;

step (b) comprises supplying electrical power to the motor;

step (c) comprises mounting a drive piston to the reciprocating pump and supplying well fluid discharged by the rotary pump to the drive piston to stroke the drive piston; and

step (d) comprises directing an exhaust portion of the well fluid being exhausted by the drive piston downward to a point below the motor, and flowing the exhaust portion upward past the motor into the intake of the rotary pump.